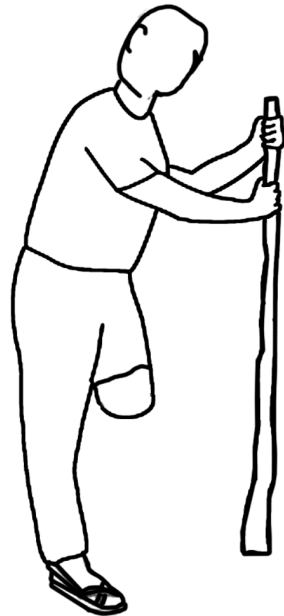


# **An Exercise Therapy Guideline for Trans-femoral Amputees Focusing on the Time Frame of Discharge from Hospital until the First Initial Prosthesis Fitting**



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**Hogeschool van Amsterdam**

Amsterdam School of Health Professions

**ESPD**  
European School  
of Physiotherapy

## **Acknowledgements**

We would like to express our gratitude towards the Ohio State University Medical Centre (OSUMC) as well as the World Health Organization (WHO) for the permission to use their pictures and further information on amputee rehabilitation. Furthermore, we would like to thank, Erica Verhoef (Physiotherapist, Reade Rehabilitation Centre, Amsterdam) and Marjan Doves (Physiotherapist, Zorgcirkel Novawhere, Purmerend) for their assistance, insight and helpful tips on amputee rehabilitation. In addition, we would like to thank Emile Pienaar (3D-Artist) for drawing up supplementary pictures necessary, our coach, Professor Jan-Jaap Voigt (European School of Physiotherapy, Amsterdam) for his guidance during the process and lastly our client, Anthony Rombach (European School of Physiotherapy, Amsterdam) who initiated our pursuit towards the compilation of this guide.

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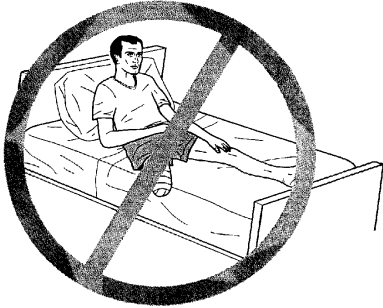
## **Introduction**

This exercise guide is aimed towards the rehabilitation of trans-femoral (above-knee) amputees in impoverished regions, who have just been discharged from hospital. This guide is meant as an aid for improving and maintaining the overall condition as well as aiding the preparation for an eventual prosthetic limb. The main focus is aimed towards lower extremity exercises, however, stump management is included as it is of great importance because the condition of the stump can influence training and in turn the rehabilitation process. In this guide you will encounter the following topics: do's & don'ts, stump management, stretching, strengthening, balance and endurance. The recommended prescription for each exercise is mentioned under the main heading. Our intention was to make this guideline as simple as possible by making use of exercises requiring non-specialized equipment. We recommend following this guide in accordance to its structure. Furthermore, we have added additional space for notes on each exercise or for translation purposes.

### **Important points to remember while following this guide**

- The exercises should be done with both lower limbs unless specified otherwise
- Do the movements slowly & controlled
- Avoid holding your breath while doing an exercise
- By adding repetitions the exercise intensity can be increased
- Mild discomfort is allowed as long as the symptoms disappear as soon as the limb is returned to a relaxed position. The exercises should NOT cause sharp pain!
- Do NOT attempt an exercise if you feel that it is too difficult & makes you feel insecure, unsafe or uncomfortable. Ask the assistance of a relative or a friend for extra support & safety.

## Do's & Don'ts

|                                                                                     |                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>- This is the <b>best resting position</b> and is encouraged as a sleeping position</p> <p>.....</p> <p>.....</p> <p>.....</p>                                                                                                                  |
|    | <p>- Do <b>NOT</b> place a pillow under your hips, knees or between your thighs and do not rest your amputated leg on a pillow when lying down, unless otherwise told to do so by a health professional</p> <p>.....</p> <p>.....</p> <p>.....</p> |
|  | <p>- Do <b>NOT</b> let your stump hang over the side of the bed</p> <p>.....</p> <p>.....</p> <p>.....</p>                                                                                                                                         |

## Stump management

Prescription: Twice daily. NOTE: Do **NOT** let soap, lotion/cream get into the open wound!

| Monday | tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|--------|---------|-----------|----------|--------|----------|--------|
| ✓      | ✓       | ✓         | ✓        | ✓      | ✓        | ✓      |

|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <p><u>Cleaning</u></p> <ul style="list-style-type: none"> <li>- The limb must be washed with soap and warm water, then gently patted dry with a towel</li> <li>- Wait approximately 2 minutes before replacing bandages</li> </ul> <div style="border-top: 1px dotted black; height: 20px; margin-top: 10px;"></div> <div style="border-top: 1px dotted black; height: 20px; margin-top: 5px;"></div> <div style="border-top: 1px dotted black; height: 20px; margin-top: 5px;"></div>                                                                                      |
|  | <p><u>Lubrication</u></p> <ul style="list-style-type: none"> <li>- Rub small amounts of lotion or cream, i.e. cocoa butter onto the limb every evening</li> <li>- Make sure to avoid open wounds &amp; that bandages or stump socks are washed daily</li> <li>- Ensure that stump sock is dry before fitting</li> </ul> <div style="border-top: 1px dotted black; height: 20px; margin-top: 10px;"></div> <div style="border-top: 1px dotted black; height: 20px; margin-top: 5px;"></div> <div style="border-top: 1px dotted black; height: 20px; margin-top: 5px;"></div> |



### Skin inspection

- Remove bandages every morning and evening in order to inspect the limb
- A mirror can be used or if possible have someone else take a look at areas you cannot easily see
- Note any open wounds on the stump!
- Make sure to also inspect the groin and buttock areas

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### Skin mobilization

When the surgical wound is still fresh:

- Start mobilization on bony areas, place fingers on a spot across the bony area
- Firmly press on that area and move the deeper tissues by moving across the bone for approximately 30 seconds
- Apply the step above to all bony areas on the stump

After the surgical wound is completely healed:

- Use the same technique as above to mobilize the skin around the scar, but then by placing two fingers across the scar

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### Desensitization

NOTE: Do **NOT** apply these techniques to open wounds! Care must be taken to prevent skin irritations or blistering (use a gentle approach)!!

Rub on the stump with different kinds of fabrics:

- Different fabrics with different textures should be used, advancing from smooth fabrics to more rough fabrics, i.e. cotton rags, wool coats and burlap sacks
- Gently rub all intact areas of the stump
- Once this is tolerated, progress to a fabric which is more rough

Tap the stump with your fingers:

- Use the pads of your fingertips and gently tap the skin of the stump

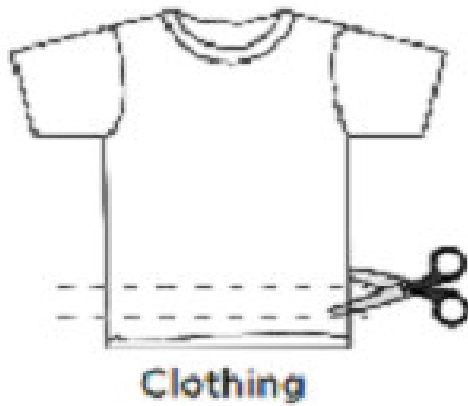
Massage the stump:

- Start by gently massaging the area closest to the hip, then gradually massage towards the end of the stump
- Once that is tolerated, the pressure can be increased to give a deeper massage

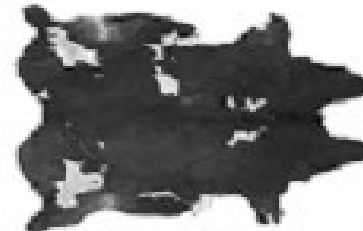
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## Stump Wrapping

Examples of materials that can be used:



Bandage



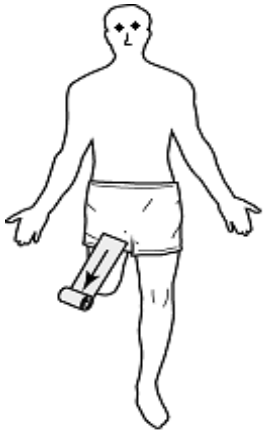
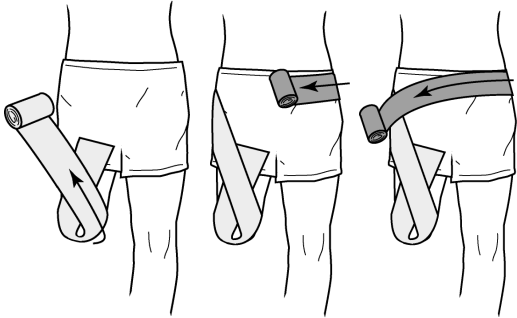
Animal hide

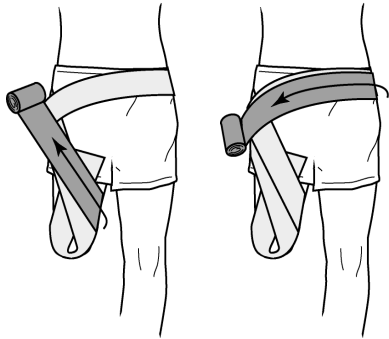
Tyre tube

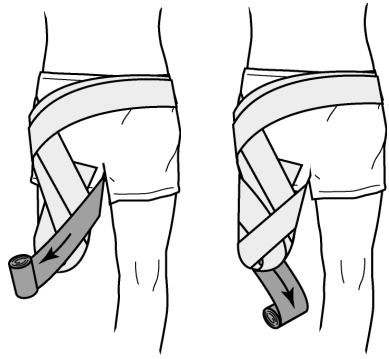
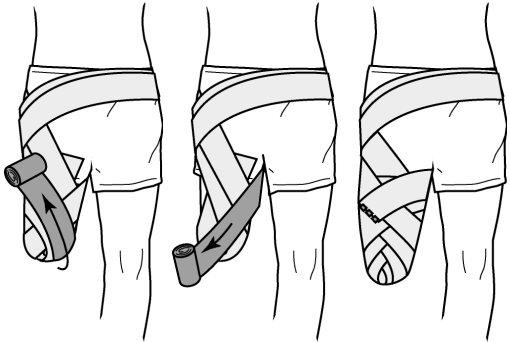


Prescription: Reapply the wrapping every 3 - 4 hours

|        |         |           |          |        |          |        |
|--------|---------|-----------|----------|--------|----------|--------|
| Monday | tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
| ✓      | ✓       | ✓         | ✓        | ✓      | ✓        | ✓      |

|                                                                                   |                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"><li>- Start at the front of your thigh, wrap the material in a diagonal, downward direction going around the bottom, outside of your stump</li></ul>                                                                                                   |
|                                                                                   | <div>.....</div> <div>.....</div> <div>.....</div>                                                                                                                                                                                                                                       |
|  | <ul style="list-style-type: none"><li>- Bring the wrap back up diagonally crossing the front of your thigh again, take it all the way up towards your hip and around your back at waist level</li><li>- Wrap it around your waist once, bringing it to the outside of your hip</li></ul> |
|                                                                                   | <div>.....</div> <div>.....</div> <div>.....</div>                                                                                                                                                                                                                                       |

|                                                                                     |                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <ul style="list-style-type: none"> <li>- Wrap down the back of your thigh by making a figure of eight around the bottom of your stump</li> <li>- Return diagonally back up towards your hip and wrap it around your waist again</li> </ul> <p>.....</p> <p>.....</p> <p>.....</p>                                           |
|    | <ul style="list-style-type: none"> <li>- Wrap across to the outside, upper part of your thigh</li> <li>- Continue down the back of your thigh, going towards the lower, inside part of your stump creating a figure of eight pattern in order to establish a firm support</li> </ul> <p>.....</p> <p>.....</p> <p>.....</p> |
|  | <ul style="list-style-type: none"> <li>- Return back up towards the front part of your stump</li> <li>- Then take the wrap back up towards the outside of your thigh</li> </ul> <p>.....</p> <p>.....</p> <p>.....</p>                                                                                                      |

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>- From the outside of your thigh, wrap across the back towards your inner thigh</li> <li>- From the inner thigh wrap downwards crossing over the front end of your stump</li> <li>- Then wrap across to the inside, then downwards to the end of your stump (a little higher than the previous time)</li> </ul> <p>.....</p> <p>.....</p> <p>.....</p>                                                                                                                                                                                                                                                                   |
|  | <p>Repeat the following steps until your leg is covered:</p> <p>NOTE: Apply less pressure with the wrap as you move up your leg and each layer should overlap the previous layer!</p> <ul style="list-style-type: none"> <li>- From the end of your stump wrap upwards across the front of your thigh to the outer side of your thigh</li> <li>- Wrap across the back of your thigh to your inner thigh</li> <li>- Then wrap downwards across the front of your thigh towards the outer end part of your stump</li> </ul> <p>Each time wrap a little higher up towards your hip than the previous time!</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> |



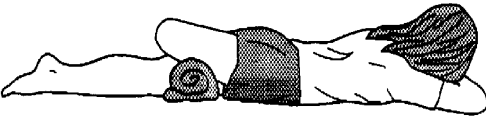
- When your leg is covered, finish off the wrapping by anchoring the end with bandage clips/a knot/tape

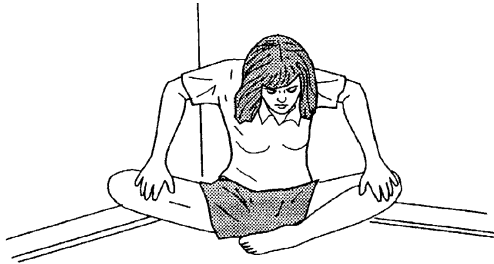
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## Stretching

Prescription: Hold stretches for 20 seconds, 3 x 10 repetitions, 3 x daily (unless specified otherwise)

| Monday | tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|--------|---------|-----------|----------|--------|----------|--------|
| ✓      | ✓       | ✓         | ✓        | ✓      | ✓        | ✓      |

|                                                                                   |                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <u>Hip flexor stretch</u> <ul style="list-style-type: none"> <li>- Lie on your stomach</li> <li>- Lie in this position for <i>20 minutes</i> supporting your stump on a rolled up towel/cloth/blanket</li> <li>- As the stretch eventually increases you can progress towards increasing the diameter of the roll</li> </ul> |
|                                                                                   | <p>.....</p> <p>.....</p> <p>.....</p>                                                                                                                                                                                                                                                                                       |



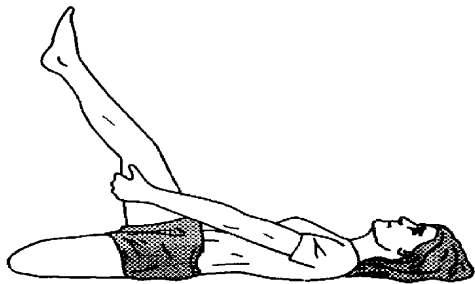
### Adductor stretch

- Sit with your back supported against a wall
- Bend your sound limb, put your amputated limb out to the side, then push down on your thighs so you feel your inner thigh stretching
- Do not lift your buttocks, have them both remain on the floor

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### Hamstring stretch

- Lie on your back
- Bring your sound limb to your chest
- Place your arm around your thigh and pull towards your chest
- Straighten your leg to the point where you feel your thigh muscle stretching

Repeat the exercise with your amputated limb!

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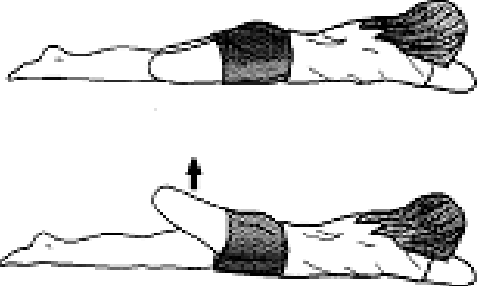
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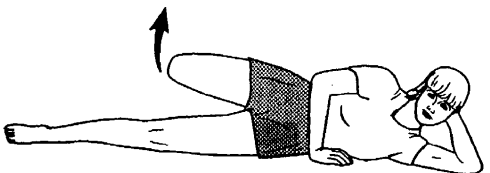
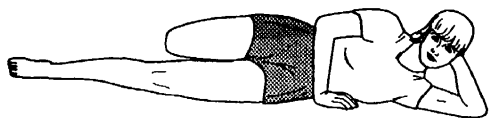
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## Strengthening

Prescription: 10-20 repetitions, 3-5 sets, 3 x a week (unless specified otherwise)

| Monday | tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|--------|---------|-----------|----------|--------|----------|--------|
|        | ✓       |           | ✓        |        | ✓        |        |

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><u>Hip Extension</u></p> <ul style="list-style-type: none"> <li>- Lie on your stomach</li> <li>- Lift your sound limb off the bed towards the ceiling</li> <li>- Return your limb to a resting position</li> </ul> <p>Repeat the exercise with your amputated limb!</p> <div style="border-top: 1px dotted black; height: 10px; margin-top: 10px;"></div> <div style="border-top: 1px dotted black; height: 10px; margin-top: 5px;"></div> <div style="border-top: 1px dotted black; height: 10px; margin-top: 5px;"></div> |
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### Hip Abduction

- Lie on your side
- Lift your amputated limb up toward the ceiling
- Return to a resting position

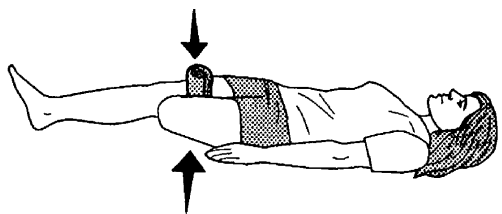
NOTE: When doing the exercise with the amputated limb, visualize lifting and pointing your heel towards the ceiling!

Repeat the exercise with your sound limb!

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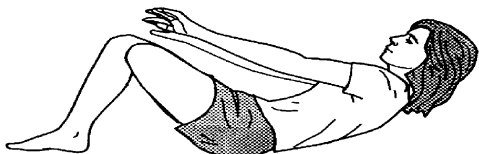
### Hip Adduction

- Lie on your back
- Roll up a towel/cloth/blanket and place it in between your legs as low as possible towards the end of the stump
- Squeeze the towel/cloth/blanket between your legs
- *Squeeze for a count of 5 seconds, relax and repeat 10 – 20 times*

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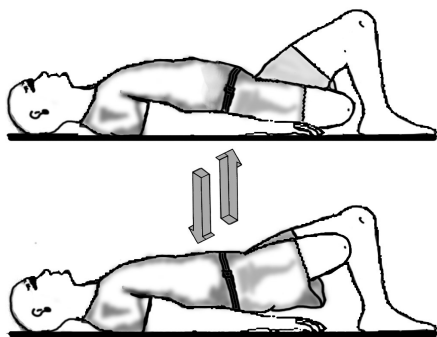
### Partial Sit-up

- Lie on your back
- Bend your hips and place the foot of your non-amputated leg in a resting position flat on the floor
- Let your hands rest on your thighs
- Curl up slowly until your head and shoulder blades are off the floor

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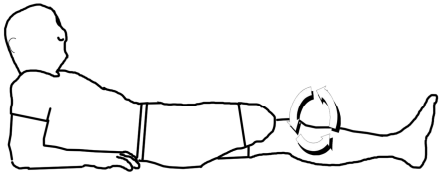
### Single leg bridge

- Lie on your back
- Bend your non-amputated leg so that your foot is flat on the floor
- By pressing your heel into the bed, lift and squeeze your buttocks
- As you lift try keeping your hips level

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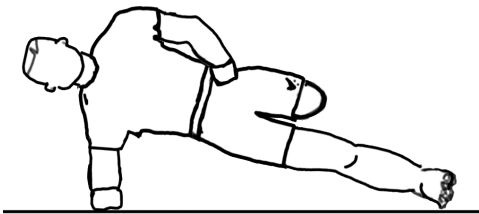


### Rotation of the hip joint

- Lie on your back supporting your upper body with your elbows
- Bend the amputated limb so that you can make circular movements with your stump
- Slowly move the stump in a circular pattern

Repeat the exercise with your sound limb!

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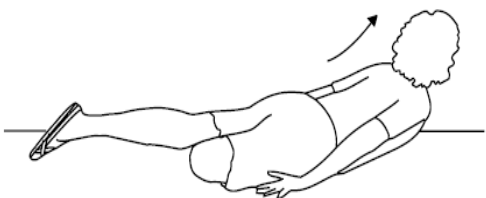


### Side bridge

- Lie on your side supporting yourself with your forearm on the floor under your shoulder to prop you up
- Contract your abdominals (stomach muscles) and buttocks, press your forearm against the floor while raising your hips to the point where your body is in a straight line from your ankles to your shoulders
- *Hold for 15 seconds, do 10-20 repetitions*

Repeat the exercise with the other side on top if no/little discomfort is experienced!

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### Back extension

- Lie on your stomach
- Place your arms alongside your body
- Arch your back lifting your torso and your legs off the floor simultaneously, and then return to a relaxed position

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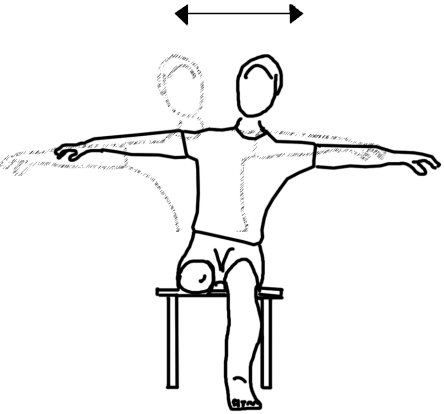
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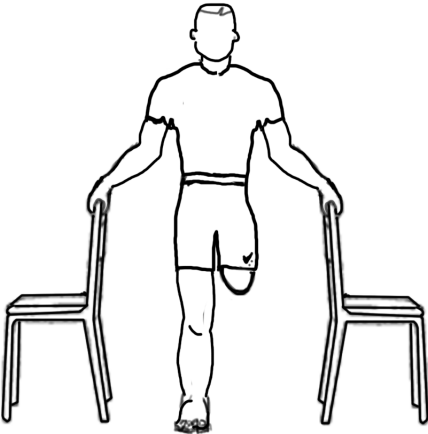
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## Balance

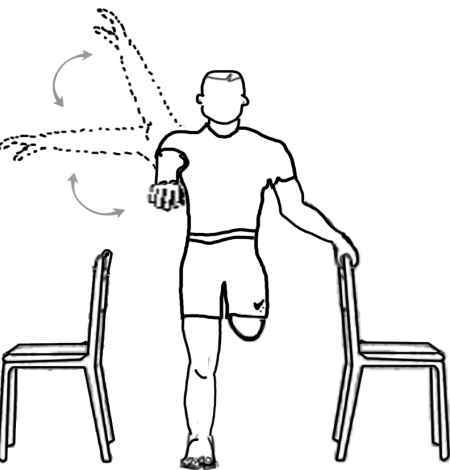
Prescription: 3 x 10 reps, 2 sets, daily (unless specified otherwise)

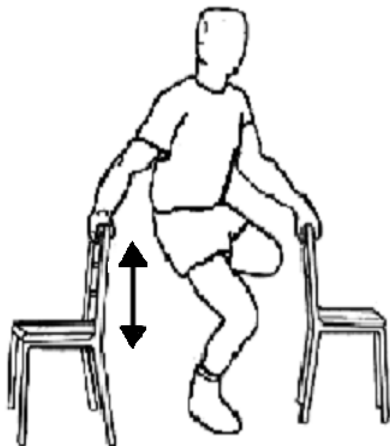
| Monday | tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|--------|---------|-----------|----------|--------|----------|--------|
| ✓      | ✓       | ✓         | ✓        | ✓      | ✓        | ✓      |

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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|  | <p><u>Moving upper body from side to side (seated)</u></p> <ul style="list-style-type: none"> <li>- Sit down on a sturdy chair</li> <li>- Place your foot firmly on the ground</li> <li>- Move your arms out to shoulder level (horizontal level)</li> <li>- Slowly move your upper body from side to side try keeping your balance</li> </ul> <div style="border-top: 1px solid black; height: 40px; margin-top: 20px;"></div> |
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|  | <p><u>Balancing on sound limb</u></p> <ul style="list-style-type: none"> <li>- Stand on your sound limb holding onto the two chairs placed on either side of your body for support</li> <li>- Try to maintain this position for at least <i>30 seconds at a time, repeating it 10 times, twice daily</i></li> </ul> |
|                                                                                   | <p>.....</p> <p>.....</p> <p>.....</p>                                                                                                                                                                                                                                                                              |

**NOTE:** Only attempt the following exercise if you were able to perform the one above comfortably!

|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><u>Balancing on sound limb (supporting with one hand only)</u></p> <ul style="list-style-type: none"> <li>- Stand on your sound limb holding onto the two chairs placed on either side of your body for support</li> <li>- Slowly release the grip with your one hand, move your arm out to the side and up towards your head</li> <li>- Slowly lower your arm again and repeat</li> </ul> |
|                                                                                    | <p>.....</p> <p>.....</p> <p>.....</p>                                                                                                                                                                                                                                                                                                                                                        |



### Single leg squat

- Stand on your sound limb holding onto the two chairs placed on either side of your body for support
- Slowly lower yourself down as far as comfortably possible by bending your sound limb
- Return to the starting position and repeat

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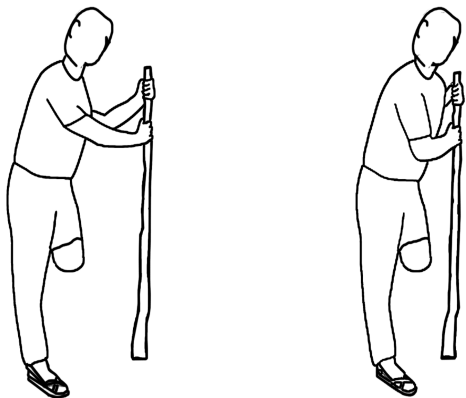
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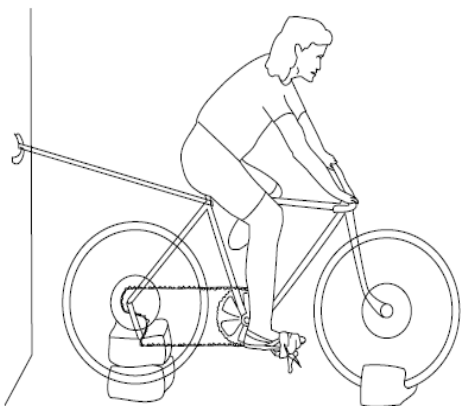
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## Endurance

Prescription: 5-7 days a week, sessions lasting for approximately 20 – 45 minutes (Note: You don't have to do all 3 exercises each day, alternate between them throughout the week!)

| Monday | tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|--------|---------|-----------|----------|--------|----------|--------|
| ✓      | ✓       | ✓         | ✓        | ✓      | ✓        | ✓      |

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><u>Walking (with the aid of a walking frame, crutches or a stick)</u></p> <ul style="list-style-type: none"> <li>- Make use of a strong, rigid stick which is more or less equal in length to your shoulder height</li> <li>- You should hold the stick on the same side as that of the amputated limb</li> <li>- Begin training on level terrain which is free of obstacles by taking small strides at first</li> <li>- As your balance improves and walking becomes less strenuous progress on to uneven terrain with obstacles</li> </ul> <div style="border-top: 1px solid black; height: 40px; margin-top: 20px;"></div> |
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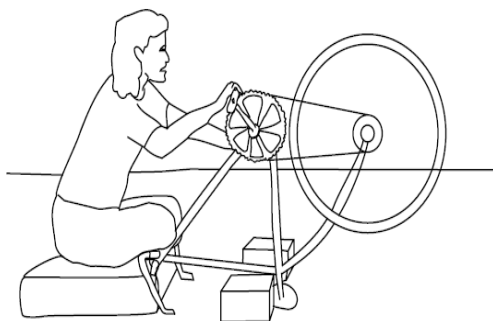
### Stationary Cycling

- Prop the bicycles rear wheel up with blocks so that it is suspended off the ground and can turn freely
- The front wheel must be stabilized and secured to the ground
- Secure the bicycle to a fixed object by means of a rope
- Secure your foot of the sound limb to the pedal with a piece of rope, fabric, belt or by fastening an old shoe onto the pedal

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### Hand-bike

- Modify an ordinary bicycle for use as a hand-bike by removing the front wheel, then turn the bicycle over onto its seat and handlebars
- Stabilize the frame to the ground by using heavy objects, i.e. rocks, bricks, rope or metal pegs
- Position yourself in such a way that you can reach the pedals comfortably with your hands

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[illegible]

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